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A More Dynamic Approach To Pollution Monitoring

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Chemical pollution is one of the major human pressures affecting the health of our seas and oceans and the goods and services they provide for human society. At present, there are about 30,000 chemicals on the European market with a production volume exceeding 1 tonne per year, according to the European Commission. These substances can, and often do, end up in rivers, estuaries and the open sea, potentially damaging marine organisms, ecosystems and processes. The continued discharge of long-established and newly emerging chemicals can cause significant damage to marine environments and may ultimately affect the prosperity, health and well-being of present and future generations.

Highly visible marine pollution events such as the *Exxon Valdez*, *Sea Empress* and *Prestige* oil spills, together with growing scientific evidence showing disastrous impacts of chemicals in the marine environment, have raised public awareness of marine pollution considerably during the past decades. Pollution is the public's primary concern when considering the issues that threaten the marine environment, according to a poll (www.clamer.eu/awareness) of more than 10,000 citizens from 10 European countries. Policymakers in Europe have responded by developing and implementing programs and regulatory measures at various geographical scales to monitor, control and reduce the pressures and impacts of chemical substances in European marine waters. However, the approach, legal framework, complexity and extent of implementation vary considerably between regional programs, which do not always take into account the latest scientific knowledge.

To date, the monitoring of European seas has been largely based on the measurement of chemical concentrations in water, sediments and biota. Concentrations only tell you something about the presence of certain substances, not necessarily whether they cause damage. The latter requires more sophisticated "effects monitoring" to gauge the specific impacts of chemicals on individual organisms, populations and whole marine ecosystems. Monitoring urgently needs to move toward environmental risk assessment procedures that consider not only the concentrations of substances but the actual risk they pose to the different compartments of coastal and open-sea systems.

Existing regulatory frameworks and large international monitoring programs do not usually target the correct range of substances. Compounds no longer considered a cause for

concern continue to be monitored, while many of the new and emerging pollutants of recent years are overlooked, such as certain halogenated and perfluorinated compounds, anti-fouling products and pharmaceuticals. The answer is more robust, science-based and dynamic marine pollution monitoring programs in which practices are continually reviewed and adapted according to changing threats and the measured impacts of a broad range of substances.

One method may be to develop a tiered system that starts with discovering unknown compounds in the marine environment and developing analytical methods for a survey to determine the extent of harmful materials. Further monitoring, if deemed necessary, would require assessment tools and methods for routine monitoring backed by quality assessment and control procedures. This approach is used by Japan and Sweden but demands significant resources and budgetary support.

An outright reduction of marine pollution in all our seas must be a common long-term goal. However, we can only regulate effectively if we implement dynamic and targeted monitoring programs. As regulatory frameworks move toward a “polluter-pays” approach and environmental taxation gains momentum, it makes sense that those responsible for the release of potentially damaging chemicals into the marine environment must take more responsibility to address the problem. An opportunity exists for industry and science to work together to develop appropriate risk-based assessments of chemicals. The time to act is now. The health of our oceans is at stake, which is a major issue for all society.